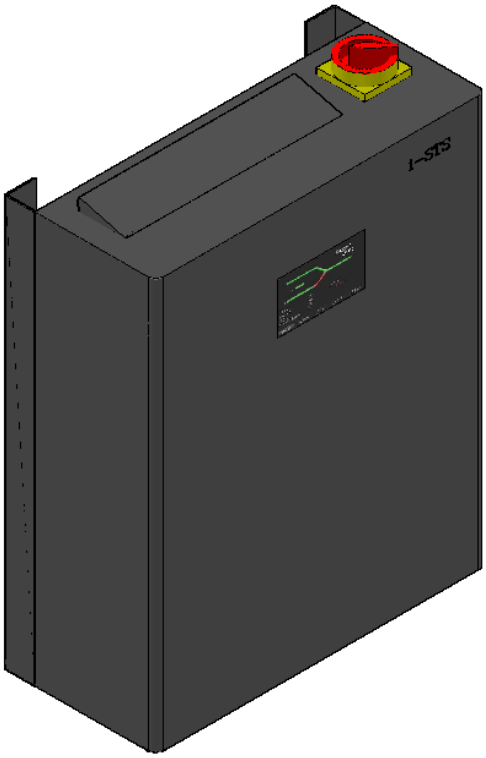
Model W
Static Transfer Switch



32 – 100 Amperes
3-phase, 4 Pole

Users Manual

May 2010

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1. System Description

1.1 Static Transfer Switch (STS)

The Static Transfer Switch (STS) provides power and redundancy to items requiring / having only a single AC supply. The STS selects this supply from one of two input AC supplies. If one of the supply sources becomes unavailable the STS will automatically transfer the critical load to the alternative AC supply source.

Manual selection of supply is also possible.

This Static Transfer Switch has 3 identical and symmetrical switches, one for each phase of the 3-phase AC supply output.

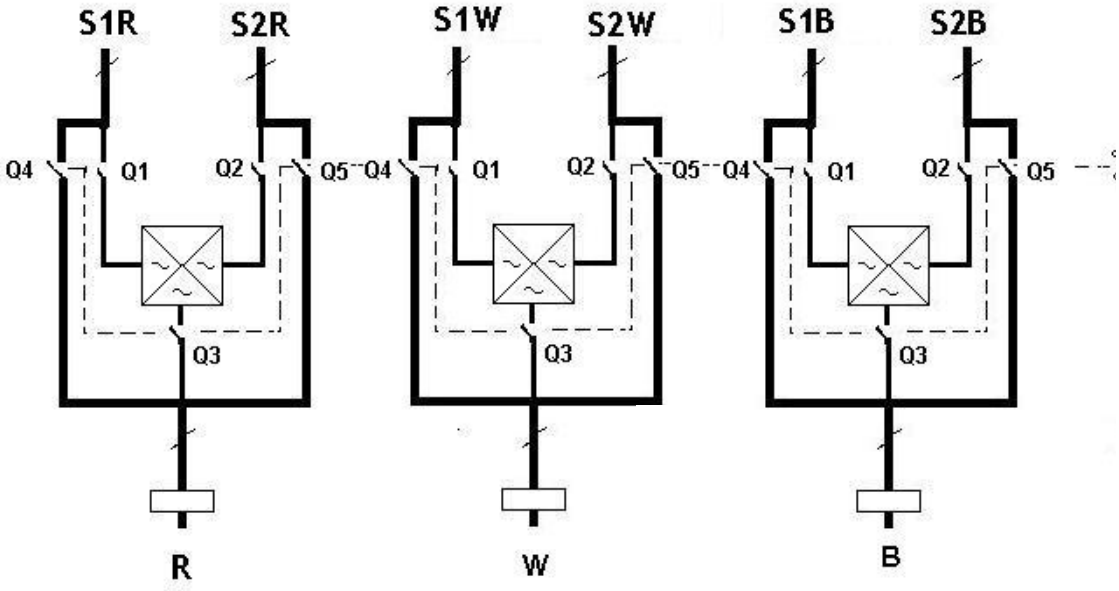


fig. 1. An example of a 3 pole STS

This STS implementation uses Break-Before-Make transfer characteristics to ensure that the two sources are never paralleled so that the failure of one supply source has no impact on the other. The supplies can be truly independent.

The installed STS is a 4 Pole switch (3-pole only shown in Fig 1) where the neutral is also switched. In the case for the neutral the transfer is overlapping.

Upon incoming supply failure or degradation of the selected supply the STS immediately transfers the critical load to the alternative stand-by source.
The break time is usually less than one millisecond, however under worst case conditions, can be up to 5 milli-seconds.

In the case of down stream load fault conditions, the fault current drawn from the supply may degrade or damage the supply sources; as a consequence should a fault current exist in the load the STS will inhibit a transfer to the alternate source even if this causes source supply degradation or loss. At least the fault will not be

1. System Description

transferred to the alternate supply with the possibility of degrading both sources. The current threshold for isolation is pre-set and is dependent on factors such as the capacity of the supply sources, line impedance and the line protection schemes employed for each STS.

The STS is completely self-contained with its own detection, logic, display and controls.

2. System Display Panel

2.1 Overview.

A Colour, back-lit, touch screen LCD provides the user with an easy to navigate hierarchical real time information and control interface.

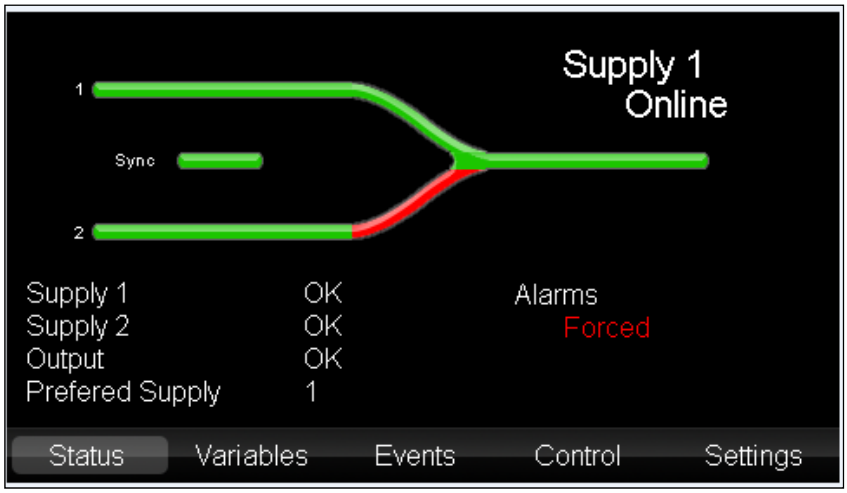


fig. 2. The system display panel.

The LCD provides a full-colour mimic, alarm / status indication and audible to provide instant recognition of the STS state.

Easily identify state changes from the mimic diagram showing system status and / or alarms (Default screen)

Use the touch screen zones along the bottom of the screen to navigate the various information and control options.

The LCD menus are structured in a hierarchy through which the operator navigates by use of the LCD control pushbuttons.

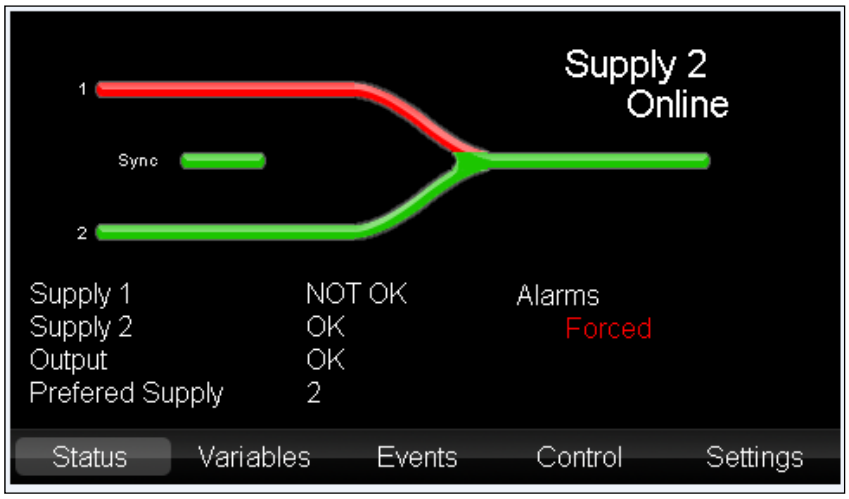
All states are bi-colour where GREEN indicates the normal or on state.

2. System Display Panel

2.1 Mimic / Status Screen

This menu item provides details on the equipment operating status and event history.
STS Status

Status summary of the Static Transfer Switch. Provides information on any active alarm or fault conditions.



The availability of supply 1 and 2 is indicated by the respective supply LCD diagram (Green being the ON or OK state).

The synchronization hold-off LED is located between the two supply bars. Green is in synchronism.

1 and 2 indicate which source is supplying the critical load.

An alarm LED indicates an unacceptable, alarm or fault condition. Information as to the cause of the alarm condition is available from the LCD event history or the status LEDs located on the control board on the inside of the front door. The alarm LED and audible alarm (if available) can be cancelled by pressing the Alarms screen.

From normal unattended operation a non normal state Clear Indication of ALARM Visual Prompt and Audible Alarm.

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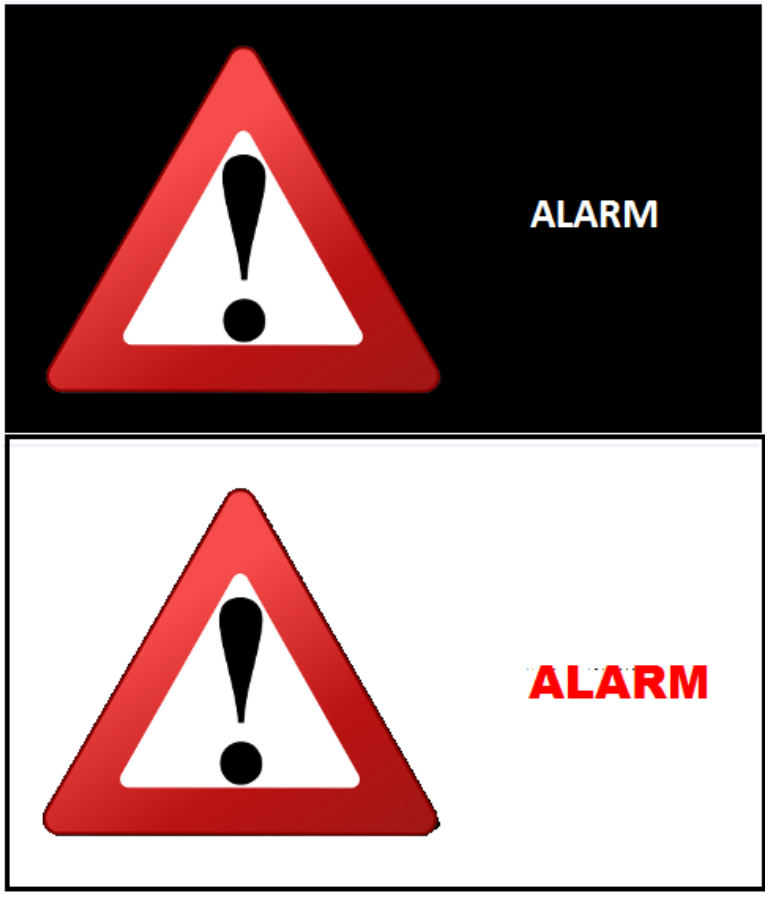
2. System Display Panel

2.2 Alarm Indication



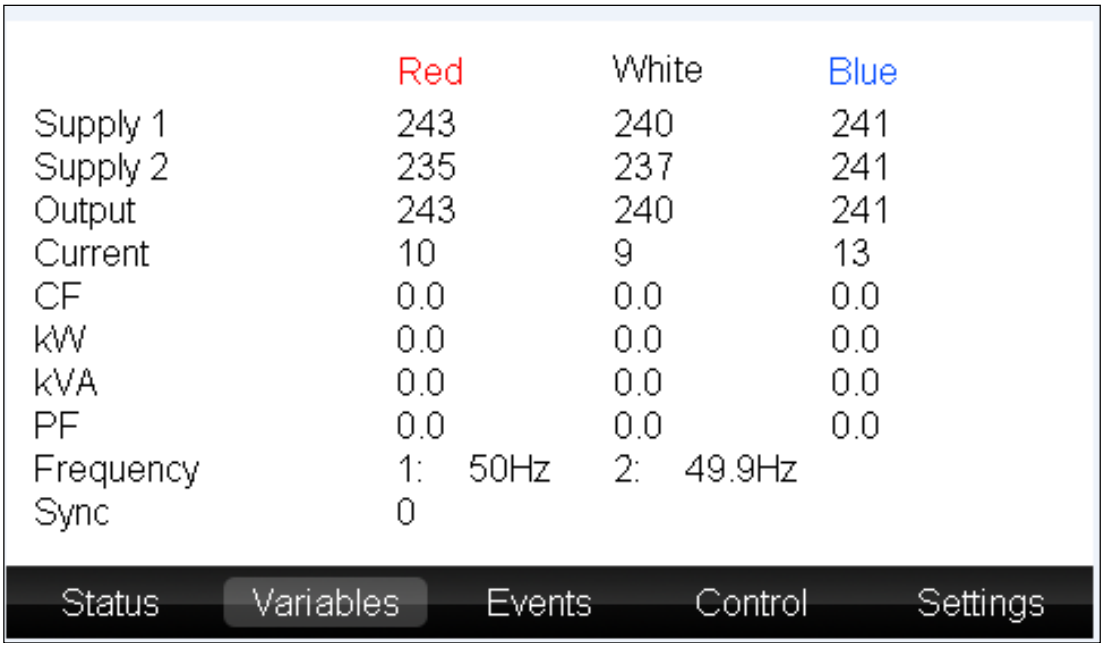
Alternating visual display of ALARM Condition

When indicated the user touches the LCD screen to acknowledge the condition, silence the audible and show the default Status display.

The LCD further provides useful real-time information such as supply variables, power quality, event log via a 100 deep, real time, easily understandable event log to provide the user with operational information displays.

2. System Display Panel

2.3 Variables Display

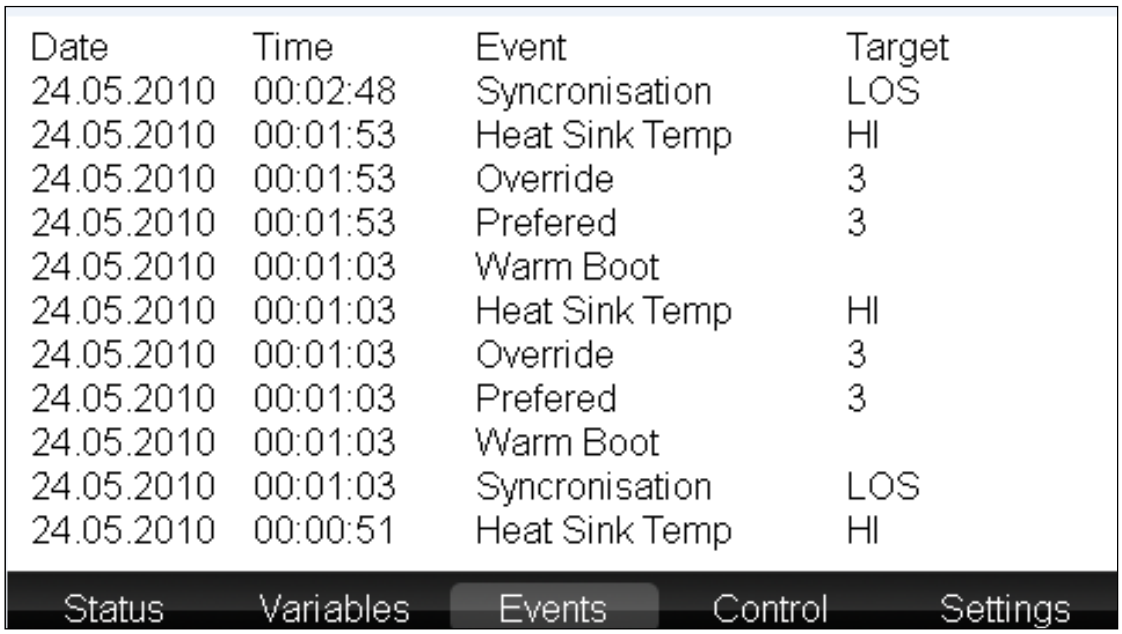


This menu item shows the input & output variables.

- Output Voltage R, W & B phase.
- Output Current R, W, & B phase.
- Output Power Factor.
- Output Power (kWatts).
- Output Power (kVA)
- Frequency for each source
- 1 Source Input Voltage R phase.
- 1 Source Input Voltage W phase.
- 1 Source Input Voltage B phase.
- 2 Source Input Voltage R phase.
- 2 Source Input Voltage W phase.
- 2 Source Input Voltage B phase.
- Phase Angle between Sources 1 & 2

2. System Display Panel

2.4 Event History



Access to the event / Alarms list is available via the “Events” screen selection. To scroll through the events buffer the user again presses the “Events” pushbutton. Up to 100 events can be scrolled.

Once the buffer is full the oldest events fall from the buffer and are replaced by any new events.

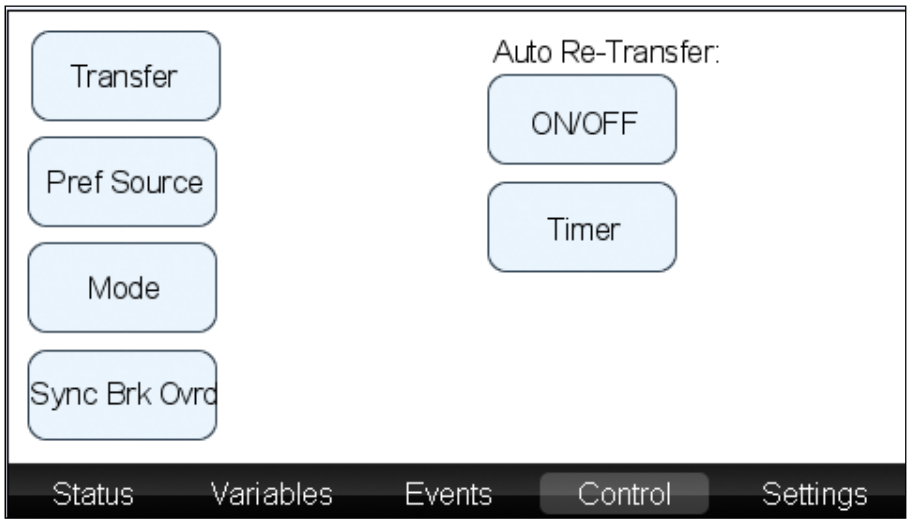
2. System Display Panel

2.5 Controls

The control interface provides access transfer and to all essential parameters and set-up information.

The TRANSFER control function forms part of the LCD control panel and is accessed using the Control touch zone screen pushbutton.

Once pressed the user / operator merely pushes the transfer pushbutton to effect a transfer to the alternate supply.



Control Functions

LCD control functions enable the user to:

- TRANSFER BETWEEN SOURCES
- SET SUPPLY SOURCE PRIORITY
- GAIN ACCESS TO ALL SETTINGS PARAMETERS
  (2 levels for each parameter =>manual & automatic)
- MANUAL /AUTO Mode Selection
- SYNCH OVERRIDE/BREAK TIMER
- AUTO RETRANSFER ON/OFF
- AUTO RETRANSFER DELAY / TIMES TO LOCKOUT

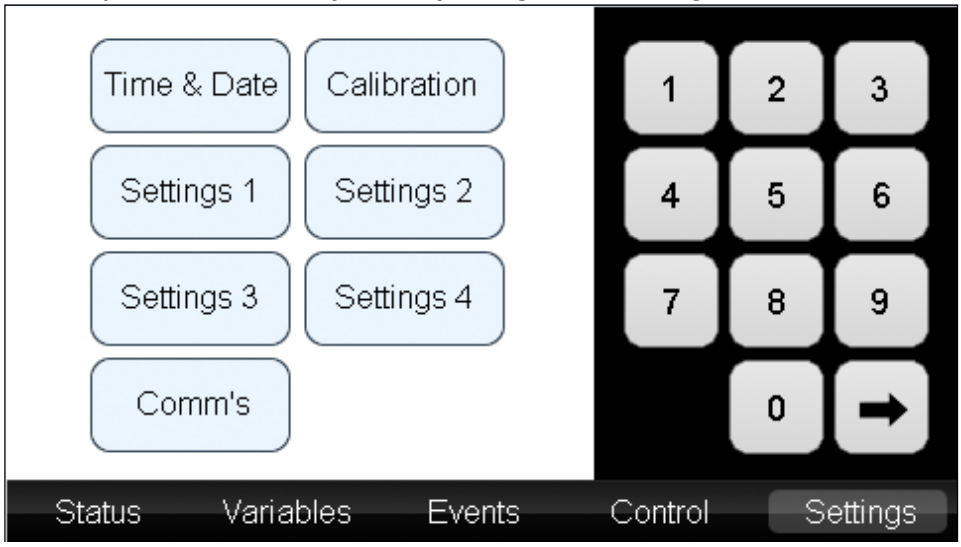
Synch Brk & Mode Angle Detection Setting

Provides access to adjust the allowable not in synchronism transfer. (Default is 9^{o} and is adjustable between 5^{o} – 30^{o}), Manual transfers are inhibited when supplies are outside this range, however, automatic transfers will experience a 50 msec break, settable (0 – 150 msec).

2. System Display Panel

2.6 Settings Menu

This menu item provides a facility for adjusting STS settings and calibrations.



2.6.1 Password
Restricted access to set-up menus (2 levels of access (000) and (1234).

2.6.2 Date / Time
Date and Time adjustment.
This menu item displays general information about the equipment.

2.6.3 Communication Settings
LAN Web Server and SNMP TCP / network address configuration.

2.6.4 Internal Settings 1, 2 & 3 (Needs Special PASSWORD for access)
Access to calibration submenus including:
Source 1 Voltage
Transient Hi /Lo
Steady State Hi / Lo

Source 2 Voltage
Transient Hi /Lo
Steady State Hi / Lo

Output Voltage
Transient Hi /Lo
Steady State Hi / Lo

Output Current
Overcurrent Threshold
Overload I2t (time and current)

Settings
Re-Transfer
Delay / no of re-tries
Preferred Source Selection

Diagnostics

2.6.6 Calibration Menus

Used to adjust display accuracy of display variables (only or +/- 2 – 3 volts, follow the prompts, read the accurate value and enter into the Actual column.

The user should exercise caution in changing the factory defaults as changing these values or incorrectly setting them could cause unstable or incorrect STS operation. Always ensure that the settings for the STS are wider than the source settings (e.g. mains and UPS).

3. STS Operation

3.1 Overview

The Static Transfer Switch control panel consists of a touch screen colour LCD display / control panel accessible via the front of the unit. These inform the user information on the operation and status of the equipment.

Other than the “Control” functions the LCD menu items cannot change the state of the Static Transfer Switch; this can only be done through the ”Control” menu; transfer pushbuttons, (except when incorrect settings are made).

Selection of the required source to supply the critical load is made by simply pressing the transfer pushbutton for at least 2 seconds. Provided the supplies are within synchronization limits, the selected supply will be connected to the load. Verification is provided by the LCD and mimic.

If the selected supply should vary outside preset limits and become unusable, the STS will automatically transfer the load to the alternative supply. The preferred source directive (presetable) will ensure that the STS will return to the preferred source if it is available and within acceptable limits, after a settling time.

The preference for the preferred source is selectable. (please see over).

Maintenance Bypass Switch

This switch situated at the top RHS of the unit allows for a maintenance bypass arrangement. The switch is normally in the “N” position and can be used to bypass the internals of the STS to either “Supply Source 1” or “Supply Source 2”. It should be noted however, that operation should only be affected in the direction of the presently operating source. It cannot be used to transfer the critical load from one source to the other.

A padlock can be used to stop inadvertent / unauthorized operation.

Please read and understand the following section (Section 4) for further information.

3. STS Operation

Preferred Source Selection

The preferred source selection does not operate if the STS is manually transferred to the alternative supply from the controls on the front panel.

Preferred source selection is pre-set by a mechanical slide switch inside the unit or via menu selection. Note that at power-up the STS will activate the preferred source, as pre-set by the slide switch, either supply 1 or 2. If no preferred source is set then the unit will not re-transfer to the original source after a fault in that source.

The internal **Preferred source selection** will override any that is set using the LCD controls sub menu. Access to the preferred source selection switches is gained via access to the internals of the STS by removing the front cover via the screws at the side of the unit and should only be undertaken by qualified and authorized personnel.

fig. 4. User control panel.

These are located within the STS cubicle, bottom RHS of the panel, as shown.

Manual transfers override the preferred source selection, (operation of STS to alternate supply say S1 when preferred is S2, where S1 fails will transfer to S2 but not return back to S1). Preferred source selector can also be used to transfer the critical load.

The **OVERRIDE** Selection must not be used to transfer the critical load from one source to the other. Use the preferred source selector to transfer the load if the LCD panel is unavailable.

Never operate the Override switch if the supplies are not in synchronism or not available.

The purpose of the override switch is to override the control electronics and lock the STS in the state / direction / source that is presently selected. It used for maintenance purposes.

Communications ports provide remote voltage free contacts for BMS or remote alarm indication and optional control of the STS from remote. The LAN enables remote viewing of the state of the STS using an internet browser or via SNMP via a Network Management System.

3. STS Operation

1. Preferred source selection (pre-set)

0	No preferred source
1	Supply 1 is the preferred source. If STS is forced to automatically transfer the critical load to the alternate (Supply 2) source the STS will automatically transfer back to Supply 1 when again within tolerance and a pre-set settling delay.
2	Supply 2 is the preferred source. If STS is forced to automatically transfer the critical load to the alternate (Supply 1) source the STS will automatically transfer back to Supply 2 when again within tolerance and pre-set settling delay.

2. Control override

(CAUTION: For maintenance only, this should not be used as a transfer control)

0	Normal – Automatic
1	Control Override -> Supply 1 is forced to supply the critical load directly overriding any internal control logic. NEVER attempt to operate the OVERRIDE switch if the supplies are not in synchronism.
2	Control Override -> Supply 2 is forced to supply the critical load directly overriding any internal control logic. NEVER attempt to operate the OVERRIDE switch if the supplies are not in synchronism.

3. User access

CAUTION

The power cabling should not be run adjacent to user controls. Separate these control cables from power circuits by at least 300 mm. The control signals are distance limited to 30 metres.

All output relays contacts are rated for 50 V DC 1 Ampere (Not 230 V AC rated)

On DB14 Connector

User Remote Inputs (Voltage free contact closure controllers only)

Pin 13 to Pin 7 Remote Transfer to S1
Pin 11 to Pin 7 Remote Transfer to S2

User Relay Outputs

Relays are normally closed and held open in OK state (closed contact represents the alarm state).

Pin 1 to 3 RLY-O/P-ONA
Pin 2 to 4 RLY-O/P- Overloaded
Pin 5 to 14 RLY-O/P-ON B
Pin 6 to 8 RLY-O/P-Not in Synch
Pin 10 to 12 General Alarm

4. Maintenance Bypass

4.1 Overview

The integral maintenance bypass switch should be used when the user is sure that the supplies are both available of the same magnitude and phase.

If the STS is on Supply 1 then the maintenance bypass switch should only be operated to position 1. Similarly if the is on Supply 2 then the maintenance bypass switch should only be operated to position 2.

If you wish to operate the bypass supply to position 2 then you must operate the STS to Supply 2 using the transfer pushbutton. This is only possible if the STS control logic is operating correctly.

In the case of a control failure the STS internal control logic can be overridden and the output can be forced to the correct state using the OVERRIDE switch to position 1 or 2 as appropriate. Remember that the switch needs to be in the centre “O” position for normal operation.

The override provides control logic bypass only’ it does not provide an alternative path for the load power.

NEVER attempt to operate the OVERRIDE switch if the supplies are not in synchronism. There is no interlock to prevent the switch from being operated when the supplies are not available or not in synchronism. Refer to the LCD variables display and mimic diagram for the not in synchronism state, (SYNC LED will be RED, variables display will show degrees out of synchronism. Only operate when less than 10 degrees). If the control is not operating you may need to use other means to determine that the supplies are in synchronism. Do not operate the OVERRIDE switch onto an absent supply.

Do not operate the unit without the fans operating. (63 & 100 Amp units only)

CAUTION

THIS EQUIPMENT RECEIVES POWER FROM MORE THAN ONE SOURCE. DISCONNECT OUTPUT AND ALL INPUT SOURCES OF POWER FROM THIS EQUIPMENT BEFORE SERVICING.

WARNING

HIGH LEAKAGE CURRENTS ON ISOLATED INCOMING AND OUTGOING CIRCUITS. EARTH CONNECTION IS ESSENTIAL BEFORE WORKING ON CIRCUITS OR CONNECTING / DISCONNECTING SUPPLIES. SEE INSTALLATION INSTRUCTIONS BEFORE CONNECTING / DISCONNECTING INPUT SUPPLIES.

4. Maintenance Bypass

Installation and Commissioning

Read this whole document thoroughly. Understand every aspect before proceeding. Request further assistance if you do not understand any aspect of the operation of the STS. Support and contact numbers are at the rear of the manual.

Consider electrical distribution discrimination carefully. The STS has two incoming AC power isolators your upstream protective devices must discriminate with down stream protective devices and limit the peak fault current to less than 35kA so that when a fault occurs other items connected to the STS are not powered off by the opening of upstream protective devices. The upstream, STS supply breaker /fuse should only open if the down stream device protection is unable to trip or there is a fault within the STS.

In case of down stream fault the STS will not transfer the fault to the alternate supply even if the voltage is adversely affected. Once the fault current has cleared the STS will resume normal operation protecting the critical loads from voltage disturbances, (10 second settling time).

After following all of the considerations and precautionary processes in the last section and been successful and understanding, then no further special set-up is necessary. Each unit has been fully certified and heat soaked prior to shipment.

The ALARM should not be active.

If it is check the following states.

- ON Supply 1 when priority is Supply 2
- On Supply 2 when priority is Supply 1
- Supply 1 or Supply 2 are not in spec.
- Override Switch is in position 1 or 2
- Supply 1 & 2 are not in synchronism
- The unit is too hot (thermal bi-metal switch on H.S. activated)
- There is / was an overcurrent/ overload / load fault condition

CAUTION

REMOVAL OF PANELS EXPOSES DANGEROUS VOLTAGES
ACCESS RESTRICTED TO QUALIFIED PERSONNEL ONLY

Ensure from the supply that you are connected to on the STS is also the supply selected by the Maintenance Bypass Switch supply. If you have a remote maintenance bypass then it too should be in the normal position, prior to this step.

Go to normal mode (Use switching procedure 3.1.2 to go on line

Try using the TRANSFER push button to transfer to the alternate supply. To affect a transfer you need to push and hold the transfer pushbutton for at least 2 seconds.

4. Maintenance Bypass

The LCD should show that it is now powering the load from the other supply, (non preferred).

If unsuccessful or the LCD is not functioning a transfer can be affected using the priority / PREFERRED switch. Simply slide the switch to the desired supply, wait 2 seconds and check the LCD and display to confirm.

5. Fault Diagnosis

5.1 Interpretation of LCD event list

Event Descriptor	Append	Description	STS Action Resulting
INITIALIZE		RAM CHKsum failed – Cold Start (RAM Corrupt) – Flash Defaults downloaded	None - Contact Chloride
WARM BOOT		Power-up, Warm Start, re-initialize all but RAM – Keeps Event List	Normal After Black Start
WATCHDOG TIMER	Diagnostic	Signals software / hardware problems	None - Contact Chloride
STACK	Diagnostic	Stack or Heap has overflowed	None - Contact Chloride
EEPROM		FLASH/ EEPROM Checksum error – cal may be damaged	None - Contact Chloride*
ROM		FLASH ROM has been corrupted (Program is in error)	None - Contact Chloride*
BATTERY		Battery has low power (needs replacing)	None - Contact Chloride*
COMMS	1/2/3/4/5/6/ 7/8	Communications has failed to Dig Proc, Ana1, Ana2, N1, N2	None - Contact Chloride (can self repair)
CALIBRATION	1/2/3	Calibration of MSP required	Contact Chloride *
LOW POWER MODE	ON/ OFF	LOW POWER MODE (Power Down Modes @ loss of electronics power)	LOW POWER MODES
S 1 / S2 / S3	AVERAGE V (R,W,B	Supply 1 or 2 OR 3 has Steady State High or Low or phase R, W or B	Transfers to supply 2 if on 1
S 1 / S2 / S3	TRANS V (Red, White, Blu)	Supply 1 or 2 OR 3 has Transient High or Low (1 sec)	Transfers to supply 2 if on 1
S 1 / S2 /S3	LOW /OK	Supply 1 or 2 OR 3 has Steady State Low (1 sec)	Transfers to supply 2 if on 1
S 1 /S2 /S3	HI / OK	Supply 1 or 2 OR 3 has Steady State High (1 sec)	Transfers to supply 2 if on 1
SUPPLY 1 or 2 or 3	FAILED / OK	Supply 1 or 2 OR 3 has Steady State High (1 sec)	Transfers to supply 2 if on 1
OVERRIDE	0,1, 2	Controls Override set to S1	User - Manual Switch Only
PREFERRED	0,1, 2	Preferred Source Set (0 or 1)	User - Manual Switch Only
S 1 / S2	FREQ LOW / HI /OK	Frequency of supply 2 is high or low	Alarm No action
LOCAL XFER	1, 2	Local Transfer to Supply 1 or 2 requested	User - Manual Action
REMOTE XFER	1, 2	Remote transfer to Supply 1 or 2 requested	Via User Inputs or BMS
BACK FEED	1 or 2 on (R, W, B)	Back feed voltage too high on S1 or S2	Contact Chloride
REMOTE POWER	OFF/ON	Remote Supply off Requested (EPO)	Via User Inputs or BMS
SYNCRONISATION	LOS / OK	S1 & S2 not in synchronism	Alarm No action

5. Fault Diagnosis

Event Descriptor	Append	Description	STS Action Resulting
CURRENT	WARN / HIGH /FAULT/OK	Output is overloaded (timed shutdown)	Alarm No action starts timer
HEAT SINK TEMP	HI /OK	Fans Failed or Over Stressed Device Temperatures, Heat Sink is Over temperature	No Action – Check & Reduce Loading or Ambient
LOAD FAULT	FLT/ CLR	There was a fault at the load	Does not transfer (Inhibit)
FAN	FAIL / OK	Status Indication Only	No Action - Repair
THDI	HI / OK	Total harmonic Distortion of current is very high	Alarm No Action – Check Load
THDV	HI / OK	Total harmonic Distortion of Voltage is too high	Alarm No action - Check Load
BREAKER OPEN	Q1, Q2, Q3, Q4 or Q5	Status Indication Only	Response to interlocking controls
BREAKER CLOSED	Q1, Q2, Q3, Q4 or Q5	Status Indication Only	Response to interlocking controls
TRIPPED	Q1, Q2, Q3, Q4 or Q5	Status Indication Only	Response to interlocking controls
ALARM CANCEL		Alarm Cancel was pressed	Resets Audible & Latched LED
POWER SUPPLY	1,2 or 3	Status Indication Only	None -Contact Chloride / Repair
SCR SC	S1,S2 R, W, B, N	SCR on S1 or S2 short circuit detected on phase #	Contact Chloride – Locks to safe source
SCR OC	S1,S2 R, W, B, N	SCR on S1 or S2 Open circuit detected on phase #	Contact Chloride – Locks to safe source

5. Fault Diagnosis

5.2 Load Fault

In case of sustained high current output load faults, the STS will inhibit a transfer to the alternate supply even if this means degradation or loss of source supply. It is therefore imperative that you ensure that the discrimination with down stream and upstream protective devices ensures that the downstream protective device always clears the fault first.

In case that all output is lost the faulty equipment should be located and removed from the STS output before re-instatement of power.

At this point it is recommended that the UPS source (1 or 2) be transferred to bypass to allow greater capacity to isolate down stream faults without affecting UPS output voltage integrity. It will be necessary to gain access to the STS internal maintenance bypass switch for 1 or 2 (switch Q4 or Q5) . The supply from the UPS system in bypass mode should be selected by manual operation of the corresponding maintenance bypass switch.

Application of this power should clear any downstream faults still present. The alarm pushbutton is then pressed for 10 seconds to reset the alarm conditions, followed by the transfer switch for the desired source to reinstate the STS to normal operation. When the LED mimic indicates that the STS is active again (the 1 or 2 LED is illuminated), the maintenance bypass isolator can be manually opened.

6. Maintenance

6.1 Overview

The STS s has been manufactured to provide a long, reliable and useful life. However, all equipment needs some maintenance.

After the welcome sign you may be prompted to enter the date and time. This should be required the first time only. We strongly encourage the setting of the date and time so that real time event correlation can be undertaken. The Real Time Clock is thereafter battery backed up.

If the STS has been off for 2-3 months awaiting installation the battery requires replacement. We recommend that the battery be replaced every 3 years as a precautionary matter.

Recommended Schedule:
Once per month record the operating variables and compare with the units specifications to ensure that you are within its operating capability. Inspect the unit and note down any variations from last observation. Action may need to be taken and or reporting may need to be taken on these variances.

Inspect the Event History and correlate any recorded events since last observation with real occurrences. Report / investigate any suspicious entries.

Once every 6 months, (sooner if the environment is bad), vacuum dust from grills at front of unit. Inspect cable / plug connections for overheating.

Units with fans need their fans changed every 3-5 years. This may need to be sooner if the environment is bad.

NOTE:

Please note that the user should not undertake repair procedures or gains access to the internal of the equipment.
If the unit is faulty then it should be removed from service as per the accompanying procedure and a qualified experienced service agent should affect repair.

7. Specifications

8.1 Operating Parameters

Rating, 3-Phase / phase	20 / 32 / 50 / 63 / 80 & 100 Amperes RMS
Voltage Rating	230 V ± 20% (115 V AC or Auto ranging available)
Permissible Voltage Distortion	15% THDV
Frequency	50 Hz ± 5% (60 Hz or Auto ranging available on request)
Type	3 Phase + N (true 4-pole, 4 x AC Static Switches /source)
Efficiency	98.9%
Transfer Type	Thyristor (break-before-make, no source overlap, zero current, neutral overlapping)
Detection	Digital (< 1 msec)
Break time	Normal; (< ½ msec), Max < ¼ cycle (5msec).
MTBF	> 800,000 Hrs
Device Ratings	100 Amperes RMS, 1600 Volts, 2 kA 10msec, 20kA A^2S
Fault rating	20 kA
dV/dt	1000 V/µsec
Minimum Current	0 Amperes
Fault Current Setting	400% Amperes peak (transfer lock-out)
Protection	Internal 100 Ampere fuses for 32 Amp unit and 125 Amp fuses for the 100 Ampere unit
Overload Capacity	Up to 120 % for 30 seconds
	200 % for 0.5 second
	400 Amperes for 100 msec
	2000 Amperes for 10 msec
User Interface	Hierarchical, Colour, backlit, touch screen real-time monitoring (internal manual override controls)
Remote I/O	5 x Voltage free contacts (50 V DC, 1 Ampere N/O) + 2 Transfer Controls
LAN Browser	Standard
SNMP	Standard
Modbus	Standard,
Operating Temperature	0 - 45 °C
Cooling	Natural (except > 63 Ampere, redundant forced)
Physical Size	450 W x 200 D x 550H
Environmental Rating	IP41
Weight	25 kg (typical)
Colour	Black Powder Coat / Black front panel (or as specified)
Compliance	IEC 62310-1,2 & 3 (for STSs), CE Approval
Inlet / Outlet Connections	Fixed Cassette terminals 25mm2 for 32 & 63 Amp units and 35mm^2 conductors for 100 Ampere unit for 3 x 4 core + Earth)

9. Main Item Components

Part	Description	Manufacturer	Part Number	Rating
thy1 – 1 to 8	thyristors	ir	sk120kq16	3000 Amps/ 1700 v
snb1, snb2	dv/dt limiter	sp	0.22/22	1000 v/usec
q1,q2	isolator	schneider	ins40n4, ins63n4, ins100n4	40/63/100 Amps
f1 & f2	fans	sunon	er60/25 12 v dc	12 V dc
F #	fuses & terminals	pheonix	um04	10 Amperes 240 v s
main power board	power control board	i-sts	sp031r1	n/a
main control card	sts control board	i-sts	sp0034r1d	63 a
colour lcd	display board	reach	51-0007	5 v dc
sp vt card	voltage feedback monitoring board	i-sts	sp035r1	n/a
sp firing card	scr gating board	i-sts	sp036r1	n/a
sp038r0	user i/o board	i-sts	sp038r0	n/a
bypass switch 32	maintenance bypass switch	asn switchgear	wa 143/32e-13 with z32/d2	32 Amperes
bypass switch 63	maintenance bypass switch	asn switchgear	wa 143/63e-13 with z32/d2	63 Amperes
bypass switch 100	maintenance bypass switch	asn switchgear	wa 143/100e-13 with z32/d2	100 Amperes
main power fuse 32/63	Semiconductor Fuse	Busman	FE100	100 Amperes
main power fuse 100	Semiconductor Fuse	Trent	TS125	125 Amperes
prs1-3	power supply +hd	meanwell	pd25a	+5 v / +12 25 w

9. Contact

9.1 Contact Details

For Service and Maintenance